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**FINAL FIELD SAMPLING
AND ANALYSIS REPORT**

**NJ ASBESTOS DUMP SITE
NEW VERNON ROAD
MEYERSVILLE, NEW JERSEY**

Prepared for:

U.S. Environmental Protection Agency

Contract No.: 68-W9-0003

Work Assignment No.: C02079

TES 6



ALLIANCE
Technologies Corporation

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**FINAL REPORT
FIELD SAMPLING AND ANALYSIS
AT THE NEW VERNON ROAD SITE
MEYERSVILLE, NJ**

Prepared for

**U.S. ENVIRONMENTAL PROTECTION AGENCY
26 Federal Plaza
Emergency and Remedial Response Division
New York, New York 10278**

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EXECUTIVE SUMMARY

Alliance Technologies Corporation (Alliance), under EPA contract No. 68-W9-0003, Work Assignment C02070, completed a sampling and analysis effort at two parcels of land associated with the National Priority List site known as the Asbestos Dump Site. This final report summarizes the results from the New Vernon Road site in Meyersville, New Jersey. The field component was conducted during early November 1990 in accordance with the Field Operations Plan (dated 10/26/90) prepared by Alliance.

The field effort included: surveying the site and establishing a grid system; collecting surface and subsurface soil samples; and analysis of selected samples. The effort also included a geophysical survey using ground penetrating radar, and ambient air sampling for health and safety purposes.

Most surface soil samples were analyzed by transmission electron microscopy (TEM). Any soils determined to contain asbestos after a visual inspection were scheduled for analysis by polarized light microscopy (PLM). The majority of the analyses were below the TEM detection limit of 0.5 percent.

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1.0 INTRODUCTION

Alliance Technologies Corporation (Alliance) prepared this Final Report as required by Work Assignment No. C02070, Contract No. 68-W9-0003, for the U.S. Environmental Protection Agency (EPA). This report summarizes the results of a sampling and analysis effort at the parcel of land located at 237 New Vernon Road in southeastern Morris County, Meyersville, New Jersey.

This Work Assignment was completed by Alliance and several competitively procured subcontractors. Site surveying activities were completed by Keller and Kirkpatrick of Parsippany, New Jersey. Hager-Ritcher Geosciences, Inc. of Salem, New Hampshire was subcontracted to perform a ground penetrating radar survey at the site. All asbestos analyses were performed by Eastern Analytical Laboratories of Billerica, Massachusetts. Drilling activities were performed by Jersey Boring and Drilling.

Field sampling at the New Vernon Road Site was part of a larger investigation that also included sampling at a parcel of land at 651 White Bridge Road. Both of these parcels are associated with the National Priorities List (NPL) site known as the Asbestos Waste Dump Site.

The purpose of this report is to summarize the results of the field measurements and analysis effort completed for this assignment. All activities completed under this task were consistent with requirements specified in the Work Plan and further documented in the Field Operations Plan (FOP). This report, though comprehensive in many technical areas, does not include all of the requirements for a complete remedial investigation. Fate, transport, and risk assessment are not discussed in this report, as these areas were outside the scope of this assignment.

Information gathered during this Work Assignment is intended to be used to assist in the selection of remedial alternatives. The data will also be used to satisfy the modeling requirements cited by the Agency for Toxic Substances and Disease Registry (ATSDR) in terms of the fiber length and diameter. The data has been reported in a format that should be usable and comparable to existing information used in similar modeling situations.

1.1 Site Background

The Asbestos Dump Site is a National Priority List site which includes four properties located in southeastern Morris County, New Jersey. These four properties are the Millington Site, the Dietzman Tract, the New Vernon Road Site, and the White Bridge Road Site. The Asbestos Dump Site project was divided into two operable units. A Record of Decision (ROD) for the first operable unit, the Millington Site, was signed on September 30, 1988. Negotiations for implementation of the remedial action were unsuccessful, and EPA issued a unilateral order to the potentially responsible party (PRP), National Gypsum Corporation. National Gypsum is currently conducting the

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remedial design for that site. The subjects of the second operable unit are the Dietzman Tract, the New Vernon Road Site and the White Bridge Road Site. In August 1990, EPA sampled the New Vernon Road and White Bridge Road sites as part of a Removal Assessment Program. The results indicate the presence of chrysotile asbestos in soils at levels up to 5 percent. EPA transmitted this data to the ATSDR for review. EPA has initiated this Work Assignment to further characterize the New Vernon Road and White Bridge Road sites. Additional soil data provided under this assignment will be used when evaluating the various remedial options for these sites.

1.1.1 Site Location/Description

The New Vernon Road Site is located in Meyersville, New Jersey and consists of approximately 30 acres of land off New Vernon Road. The address is 237 and 257 New Vernon Road. There are two residences nearby; one is adjacent to the site and one is across the street from the site. There is also a tennis club (large ballooned enclosure) directly across the street.

The majority of the site is grassy and well maintained. The front of the property shows no evidence of the past fill area. The house on the site is located adjacent to the east-west driveway which almost bisects the property (see Figure 1-1). This driveway extends to the east approximately 1,000 feet into an open area (main landfill area). The fill area is approximately 200 to 300 feet long. This area is cluttered with tree trunks and logs. Prior to reaching the open area, the driveway branches to the north, approximately 200 feet, where the owner has a tree servicing business. The business maintains several large trucks and a two-story building. Another driveway exits the property from this operation on the northwest corner. Most of the access roads on the property have been paved.

According to the draft Remedial Investigation (RI) report, the New Vernon Road Site contains asbestos wastes in a small landfill area in front of the private residence, in the main landfill area in the center of the property, along the dirt driveway that traverses north-south along the middle of the property, and in the area of the former shed located next to the private residence.

The main driveway adjacent to the house and leading from New Vernon Road to the tree service building has been recently paved. Previously, it contained gravel, dirt, and asbestos tile chips. At the main landfill area toward the back of the property, the driveway is covered with a geotextile fabric. The former shed located approximately 100 feet south of the main house has been disassembled, as it contained asbestos shingles and friable asbestos material. Asbestos tile chips are found in the soil, grass, and gardens around the houses, as well as further back in the property near the driveways.

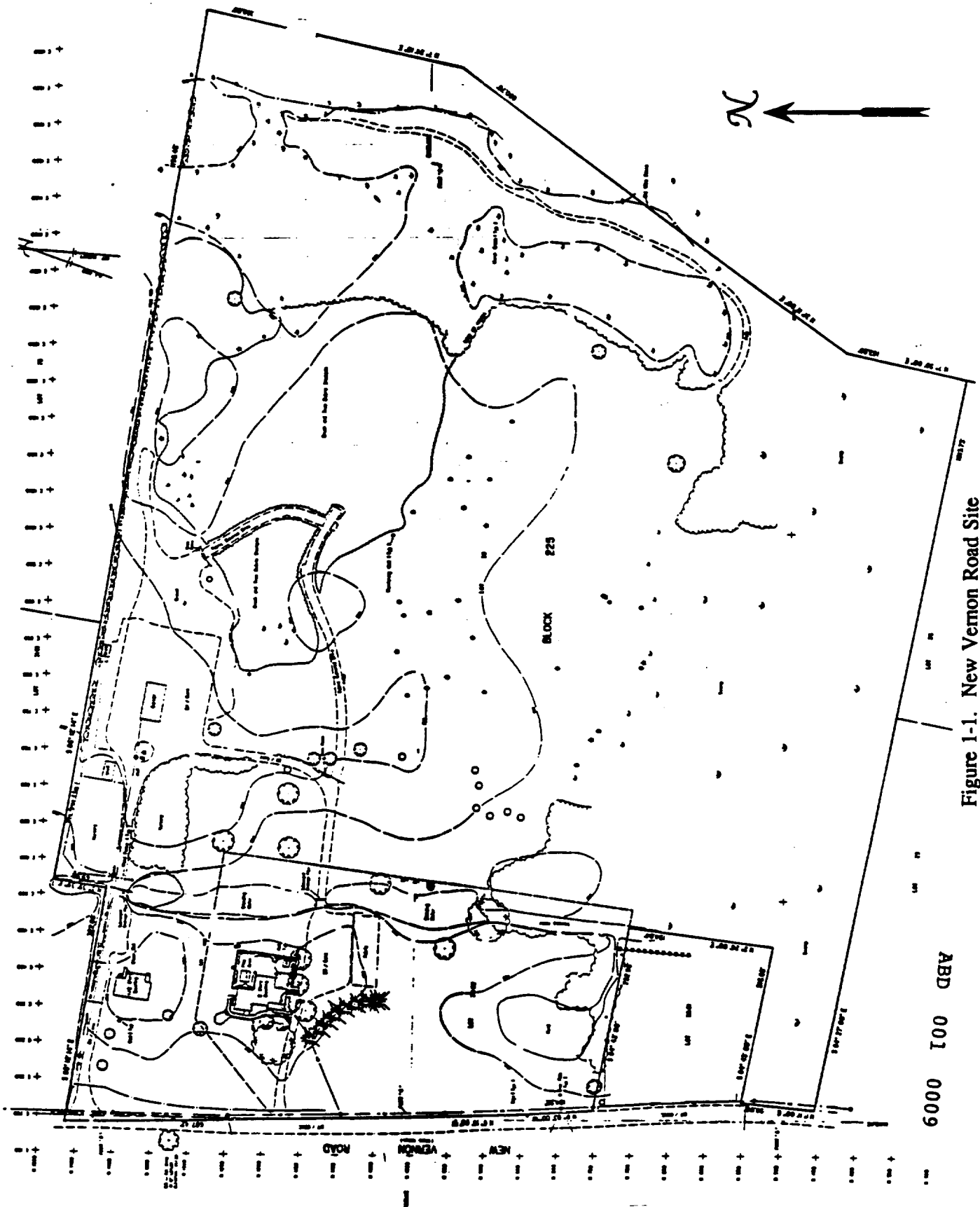


Figure 1-1. New Vernon Road Site

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1.1.2 Site History

The land at the New Vernon Road Site was used as a corn and dairy cattle farm from 1945 until 1980. However, in the late 1960s, for a period of approximately two years, refuse from National Gypsum was landfilled in two areas at this location. The refuse included loose asbestos fibers and broken asbestos tiles and siding. A small depression in the westernmost corner was filled first. Then a larger depression in the middle of the property was filled. The property was purchased by the current residents in 1980 and was graded and seeded. Currently there are five people residing at the site: a husband and wife, their two children, and a tenant.

Representatives from the Remedial Action Branch (RAB), Environmental Response Team (ERT), and Fish and Wildlife Services (FWS) conducted site visits in March and June 1990 to complete the removal assessment for the site. Based on ERT recommendations, the RAB collected soil and dust samples from the site on August 2, 1990. The soil samples were collected from various points at the surface of the driveway and the shed, and a dust sample was collected from the homeowner's vacuum cleaner. Samples were analyzed for percent asbestos content and type of asbestos fiber using transmission electron microscopy (TEM). On August 24, 1990, ERT collected a dust sample from within the house on the site and analyzed it by both TEM and polarized light microscopy (PLM).

Samples collected by the RAB confirmed visual observations that friable asbestos was present throughout the driveway of the New Vernon Road Site. Samples of the soil indicate 2 to 5 percent chrysotile content. The sample collected from the vacuum cleaner revealed 2 percent chrysotile content in the dust. A sample collected from the shed revealed 5 percent chrysotile content in the soil.

1.1.3 Previous Investigations

Previous investigations of this parcel of land were conducted by the potentially responsible party and EPA. Fred C. Hart Associates completed a remedial investigation of the NPL Asbestos Waste Site for National Gypsum Company and summarized their findings in a draft report dated May 29, 1987. The draft RI contained limited information directly relevant to asbestos contamination.

The EPA investigation was performed during August and September 1990 and consisted of a site walkover and the collection of several types of samples for subsequent asbestos analyses. It was from this effort that EPA concluded additional information relevant to asbestos in soil should be collected. EPA completed additional work at this site including: disassembly and removal of the shed, covering various areas with geotextile fabric and paving the driveways. Alliance completed an inspection of the interior of the house at 237 New Vernon Road. The inspection was limited to the half of the house

rented by the tenant. The inspection was completed by a member of the Alliance Project Team who has certifications as a Safety Inspector (State of NJ) and as an Asbestos Inspection and Management Planner (EPA). The inspection was completed October 12, 1990. Virtually all accessible portions of the house were inspected. Three samples were collected, none of which contained detectable amounts of asbestos. Based on this inspection, it was judged that there was no asbestos containing material in this portion of the frame house at this site.

1.2 Project Approach as Detailed in the FOP

This Work Assignment required the performance of several different types of field activities to assist in characterization of the site. Tasks performed include: surveying the site to develop a grid pattern for sampling purposes and topographic maps; a geophysical investigation utilizing ground penetrating radar in selected locations; soil sampling using hand augers and in some instances, a drill rig; and analysis of the soil samples at a National Institute of Standards and Technology (NIST) certified laboratory. The FOP provided a complete summary of the activities to be completed under this assignment.

1.2.1 Site Survey and Grid Patterns

Alliance subcontracted the surveying activities to Keller and Kirkpatrick, a licensed surveyor from Parsippany, New Jersey. This task required the establishment of site bench marks for future reference, elevations specific to site features, the generation of a topographic map and a site grid. The survey responsibilities, records and procedures followed the specifications presented in *Compendium of Superfund Field Operations Methods*, U.S. EPA, September 1987.

Mapping shows all planimetric features including, but not limited to, buildings, walks, roads, fences, ditches, trees, utility poles, pits, ponds, and other features as well as contours and spot elevations on roads, dikes, and ditch inverts.

All horizontal and vertical control points are shown on the final map along with tabulation of coordinates and elevations. The description, origin, and elevations of the bench marks used for the mapping control are also shown on the map.

The horizontal coordinate system has been referenced to a local recoverable baseline at the site. The state plane coordinate system was used. The map shows the basis of bearing, north arrow, names of streets and highways, project number, project name, and a bar scale.

A grid pattern was developed to assist in the identification of sampling locations. The New Vernon Road Site had a 50 by 50 foot grid pattern across areas in the vicinity of

the homes and the adjacent field. All other areas of the site were based on a 100-ft grid. Numerous points were deleted due to inaccessibility.

1.2.2 Geophysical Investigations

Ground penetrating radar (GPR) was applied to characterize the nature of subsurface stratigraphy. GPR does not specifically enable primary detection of asbestos materials. However, interpretation of the GPR data has helped distinguish fill material from naturally deposited sediments.

The primary objective of the GPR survey was to characterize the lateral and vertical extent of the fill areas. A secondary objective was to obtain reconnaissance GPR profiles in selected areas presumed not to have been filled. The GPR method was selected for the survey because of its ability to provide continuous, rather than point-by-point, profiles of subsurface conditions.

A Geophysical Survey Systems, Inc., Model SIR-3:VDU-38 ground penetrating radar system was used for this survey. The system consisted of an electronics unit, power supply, graphic recorder, color video display unit and transmitting/receiving antenna. The transmit/receive antenna is housed in a box that is moved across the surface. The antenna transmits electromagnetic signals into the subsurface and then detects, amplifies, and displays reflections of the signals in real time on a graphic recorder and color video display unit. The result is a radar record of the subsurface. The data are also recorded on a tape recorder for later computer processing and detailed interpretation.

Preliminary data were acquired at each site using both 500 and 300 MHz antennas. The 300 MHz antenna achieved better signal penetration and was used for most of the survey. Several profiles were run with both GPR antennas and a few with only the 500 MHz antenna.

Initial test profiles at the New Vernon Road Site indicated that the maximum GPR signal penetration at the site was generally less than about 60 nanoseconds (nsec). Thus, GPR data were recorded for this survey with a time window of 90 nsec. The 90 nsec time window represents an estimated maximum depth of investigation of about 10 feet, using a handbook travel time of 9 nsec/foot for silt and clay-rich soils.

The GPR antenna was pulled by hand for all profiles. The profiles were acquired on the staked grid provided by Alliance Technologies, in the locations specified. The profiles are generally spaced 50 feet apart.

1.2.3 Field Sampling

Samples were collected for the surface and subsurface soils. In addition, air samples were collected for health and safety purposes.

Alliance used a combination of hand **augering** and drill rig services to collect soil samples at predetermined locations. **Surface** and subsurface samples were collected at the following intervals: 0 to 6 inches, 6 to 18 inches and 18 to 36 inches. All analyses were for asbestos content. Specific analytical techniques varied depending on sample location and characteristics. The air sampling component involved personal monitoring and ambient air monitoring. All analyses of the air samples were by PCM.

Surface and subsurface soil samples were collected near the intersecting grid nodes within the site. Surface sampling featured a core sample to a depth of 6 inches at each node. Subsurface samples were collected at depths of 6 to 18 inches and 18 to 36 inches, using hand augers, split-spoons, or thin-wall tube samplers. Samples from each depth were laid out separately on plastic sheeting.

Each collected soil sample was visually examined for evidence of suspected asbestos material. If the sample appeared to contain asbestos, the sample was submitted for PLM analysis. If no asbestos contamination was suspected, the sample was submitted for TEM analysis. Initially, only surface soils were selected for analysis. Later, a random selection of subsurface soils was submitted for TEM analysis.

1.2.4 Analytical Procedures

In the performance of this Work Assignment, several hundred soil samples were taken at the New Vernon Road Site. These samples consisted of a variety of materials including friable and non-friable asbestos-containing material (ACM), organic matter, topsoil, sand and other inorganic matter. Additionally, there were air samples taken to determine ambient concentrations during soil boring and sampling activities.

Four analytical approaches were used to characterize the extent of contamination. These were: visual screening, polarized light microscopy, transmission electron microscopy, and phase contrast microscopy. More detail on these procedures is presented in the Quality Assurance Project Plan (QAPjP) component of the Field Operations Plan (FOP).

1.2.5 Deviations from the FOP

There were no major deviations from the FOP during the field/analysis effort. The number of sample points was not firmly defined in the FOP. After review of the site and discussion with EPA, it was agreed that the number of sample points would be between

130 and 140. Alliance finished the New Vernon Road Site with the collection of samples from 164 points.

The most notable deviation from the FOP was regarding the number of air samples collected. There was only one sampling period per day (rather than two). This represented a reduction of five samples per day. This decision was based on the agreement that one sample period would be sufficiently representative for daily activities.

The FOP also estimated the drilling effort to be three points. This was increased to better characterize known fill areas as well as obtain samples in those areas that could not be completed by hand.

None of these deviations are suspected to have an adverse impact on the overall quality of the data generated under this Work Assignment.

1.3 Report Organization

The remainder of this report is divided into three major sections: Summary of Results; Nature and Extent of Contamination; and Summary and Conclusions. The Site Survey and Percent Asbestos Surface Soil Maps are included in a Map Pocket at the back of this volume. Raw Data are provided as Appendices. All appendices are in Volume II.

Section 2, Summary of Results, includes tabulated results of the numerous analyses performed for this assignment. Also included within this section are several site maps used for identifying sample points and concentrations. Results from the ground penetrating radar survey and the health and safety air monitoring conducted during the field effort are tabulated. This section also has a summary of quality control measures and data limitations identified during the data reduction and validation component of this assignment.

Section 3, Nature and Extent of Contamination, further defines areas and estimated volumes of asbestos contamination identified during this assignment. Several geologic cross-sections are presented to better characterize the volume and location of fill material.

Section 4, Summary and Conclusions, reviews data issues discussed in the report. The subsection for conclusions includes recommendations for remedial actions.

Volume II of this report includes: lab data sheets, analytical summary sheets, the complete GPR report, and results of the lab audit.

2.0 SUMMARY OF RESULTS

This section summarizes the results of the sampling and analysis effort. It is divided into: a series of tables listing analytical results; a discussion on the ground penetrating radar results; a summary of quality control results; and data limitations.

2.1 Soil Investigation

Several tables are presented in this subsection to summarize analytical results. Table 2-1 lists the percent asbestos detected in the samples analyzed during this Work Assignment. The samples which were analyzed represent a subset of the actual samples collected. The following samples were selected for analysis:

- All surface samples
- A random selection of subsurface samples

All other samples were archived for possible future analysis.

Table 2-1 shows 189 analyses were performed by transmission electron microscopy and 41 analyses were performed by polarized light microscopy. The TEM data shows 125 of 189 analyses found no asbestos. Of the 64 samples analyzed by TEM where asbestos was found, 0.08% was the average concentration, with only three samples at a concentration greater than 1 percent. This was expected since samples scheduled for TEM analyses were from areas thought to be free of asbestos-containing material.

Of the 41 samples analyzed by PLM, 25 were reported to be <1% or 0. Several samples that were reported <1% were also analyzed by TEM to better quantify the concentration. Samples that were scheduled for PLM analyses were collected from areas of known asbestos contamination or were judged by the field sampling personnel to contain asbestos.

Table 2-2 lists all samples analyzed by TEM that had detectable quantities of asbestos present. Also listed are the characteristics of the asbestos fibers found in these samples. Review of this data shows the averages for the dimensions of the chrysotile fibers to be: length 4.3 microns; width 0.10 microns and; thickness 0.09 microns. Several of the fibers were so small that a thickness value was not reported.

Table 2-3 is provided to compare surface and subsurface concentrations. Information from Table 2-1 was sorted to remove all data points that did not have analytical results of subsurface samples. This subset was further refined to remove data points that had "0" for both the surface and subsurface sample.

Table 2-1. Analytical Results Summary - New Vernon Road

Grid Point	Sampling Date	Depth (Inches)	Analytical Technique		Comments
			TEM % Asbestos	PLM % Asbestos	
N 500 E 1100	-11/7-	6	0		
N 500 E 1200	-11/7-	6	0		
N 500 E 1300	-11/7-	6	0		
N 600 E 1100	-11/7-	6	0		
N 600 E 1200	-11/7-	6	0		
N 700 E 700	-11/6-	6	0		
N 700 E 800	-11/6-	6	0		
N 700 E 800	-11/6-	18	0		
N 700 E 900	-11/6-	6	0		
N 700 E 1000	-11/7-	6	0		
N 700 E 1100	-11/7 -	6	0		
N 700 E 1200	-11/7 -	6	0		
N 700 E 1400	-11/8-	6	0		Lab Duplicate
N 700 E 1400	-11/8-	6	0		Lab Duplicate
N 750 E 300	-11/5-	6 A	0		Field Duplicate
N 750 E 300	-11/5-	6 B	0		Field Duplicate
N 750 E 450	-11/5-	6	0		
N 800 E 250	-11/5-	6	0.007253		
N 800 E 362	-11/5-	6	0		
N 800 E 700	-11/6-	6	0		
N 800 E 800	-11/6-	6	0.000358		
N 800 E 900	-11/6-	6	0		
N 800 E 900	-11/6-	18	0		
N 800 E 1000	-11/7-	6	0		Lab Duplicate
N 800 E 1000	-11/7-	6	0		Lab Duplicate
N 800 E 1100	-11/7-	6 A	0		Field Duplicate
N 800 E 1100	-11/7-	6 A	0		Lab Duplicate
N 800 E 1100	-11/7-	6 B	0		Field Duplicate
N 800 E 1100	-11/7-	18 A	0		
N 800 E 1200	-11/7-	6	0		
N 800 E 1300	-11/7-	6	0		
N 800 E 1400	-11/8-	6	0		

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy
 TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

Table 2-1. Analytical Results Summary – New Vernon Road

Grid Point		Sampling Date	Depth (Inches)	Analytical Technique		Comments
				TEM	PLM	
				% Asbestos	% Asbestos	
N 800	E 1450	-11/8-	6	0		
N 822	E 600	-11/6-	6	0		
N 900	E 250	-11/5-	6	0.001381		
N 900	E 250	-11/5-	18	0		
N 900	E 300	-11/5-	6	0.00297		
N 900	E 350	-11/5-	6 A	0.000364		Field Duplicate
N 900	E 350	-11/5-	6 B	0.004047		Field Duplicate
N 900	E 350	-11/5-	18 A	0		
N 900	E 450	-11/5-	6	0.000917		
N 900	E 500	-11/13-	6	0.000598		Lab Duplicate
N 900	E 500	-11/13-	6	0		Lab Duplicate
N 900	E 550	-11/9-	6	0.001201		
N 900	E 600	-11/5-	6	0		
N 900	E 700	-11/6-	6 A	0		Field Duplicate
N 900	E 700	-11/6-	6 B	0		Field Duplicate
N 900	E 800	-11/6-	6	0		
N 900	E 800	-11/6-	18	0		
N 900	E 900	-11/6-	6	0		
N 900	E 1000	-11/6-	6	0		Lab Duplicate
N 900	E 1000	-11/6-	6	0		Lab Duplicate
N 900	E 1100	-11/7-	6	0		
N 900	E 1200	-11/7-	6 A	0		Field Duplicate
N 900	E 1200	-11/7-	6 B	0		Field Duplicate
N 900	E 1200	-11/7-	18 A	0		
N 900	E 1300	-11/7-	6	0		Lab Duplicate
N 900	E 1300	-11/7-	6	0.000858		Lab Duplicate
N 950	E 300	-11/6-	18	0		
N 950	E 400	-11/6-	18	0		
N 950	E 1450	-11/8-	6	0		
N 1000	E 250	-11/5-	6	0.000938		
N 1000	E 250	-11/5-	18	0		Lab Duplicate
N 1000	E 250	-11/5-	18	0		Lab Duplicate

PLM – Polarized Light Microscopy; TEM – Transmission Electron Microscopy
 TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

Table 2-1. Analytical Results Summary - New Vernon Road

Grid Point	Sampling Date	Depth (inches)	Analytical Technique		Comments
			TEM % Asbestos	PLM % Asbestos	
N 1000 E 300	-11/5-	6	0.003281		
N 1000 E 350	-11/5-	6	0.005827		
N 1000 E 350	-11/5-	18	0		
N 1000 E 400	-11/8-	6	0		
N 1000 E 450	-11/5-	6	0		
N 1000 E 450	-11/5-	18	0		
N 1000 E 550	-11/8-	6		30	
N 1000 E 600	-11/5-	6	0.013651		
N 1000 E 600	-11/5-	18	1.05241		
N 1000 E 700	-11/5-	6	0		
N 1000 E 800	-11/6-	6	0		
N 1000 E 900	-11/6-	6	0.000235		
N 1000 E 1000	-11/6-	6	0.000190		
N 1000 E 1100	-11/8-	6	0.421462		
N 1000 E 1275	-11/7-	6	0.348931		
N 1000 E 1500	-11/8-	6	0		
N 1021 E 395	-11/9-	6	0		
N 1037 E 550	-11/8-	6 A		20	Field Duplicate
N 1037 E 550	-11/8-	6 B		20	Field Duplicate
N 1037 E 550	-11/8-	18 A	1.048996		
N 1050 E 300	-11/6-	18	0		
N 1050 E 1500	-11/8-	6	0		
N 1050 E 1550	-11/8-	6	0		
N 1062 E 429	-11/9-	6	0.000471		Lab Duplicate
N 1062 E 429	-11/9-	6	0		Lab Duplicate
N 1062 E 429	-11/9-	24	0		
N 1063 E 300	-11/9-	6	0		
N 1071 E 1100	-11/12-	6		10	
N 1095 E 300	-11/5-	6	0.030189		
N 1100 E 250	-11/5-	6 A	0.001021		
N 1100 E 250	-11/5-	18 A	0.000196		
N 1100 E 300	-11/5-	6	0.002288		

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy
 TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

Table 2-1. Analytical Results Summary - New Vernon Road

Grid Point	Sampling Date	Depth (Inches)	Analytical Technique		Comments
			TEM % Asbestos	PLM % Asbestos	
N 1100 E 350	-11/5-	6	0		Lab Duplicate
N 1100 E 350	-11/5-	6	0		Lab Duplicate
N 1100 E 560	-11/9-	6		< 1	
N 1100 E 560	-11/9-	24	0.335926		
N 1100 E 600	-11/5-	6	0.288803		
N 1100 E 600	-11/9-	6		< 1	
N 1100 E 700	-11/9-	6 A		0	Field Duplicate
N 1100 E 700	-11/9-	6 B		0	Field Duplicate
N 1100 E 700	-11/9-	24 A	0		
N 1100 E 800	-11/6-	6		3	
N 1100 E 900	-11/6-	6		0	
N 1100 E 900	-11/6-	6 A		0	Field Duplicate
N 1100 E 900	-11/6-	6 B		< 1	Field Duplicate
N 1100 E 950	-11/12-	6		5	
N 1100 E 1250	-11/7-	6	0.002542		
N 1100 E 1500	-11/8-	6	0		Lab Duplicate
N 1100 E 1500	-11/8-	6	0		Lab Duplicate
N 1100 E 1500	-11/8-	18	0		Lab Duplicate
N 1100 E 1500	-11/8-	18	0		Lab Duplicate
N 1128 E 800	-11/12-	6 A		10	Field Duplicate
N 1128 E 800	-11/12-	6 B		5	Field Duplicate
N 1140 E 358	-11/6-	18	0.099888		
N 1150 E 207	-11/6-	6 A			Field Duplicate
N 1150 E 207	-11/6-	6 B			Field Duplicate
N 1150 E 207	-11/6-	18 A	0.01145		
N 1150 E 235	-11/9-	6	0		
N 1150 E 250	-11/9-	6	0		
N 1150 E 300	-11/6-	18	0.010848		
N 1150 E 300	-11/6-	6			
N 1150 E 450	-11/7-	6	0.032446		
N 1150 E 500	-11/5-	6	0		
N 1150 E 700	-11/12-	6		< 1	

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

Table 2-1. Analytical Results Summary - New Vernon Road

Grid Point	Sampling Date	Depth (Inches)	Analytical Technique		Comments
			TEM % Asbestos	PLM % Asbestos	
N 1150 E 700	-11/12-	24	0		
N 1150 E 800	-11/6-	6		15	
N 1150 E 1550	-11/8-	6	0.001233		
N 1173 E 322	-11/8-	6		< 1	
N 1173 E 322	-11/8-	72	0		
N 1181 E 250	-11/8-	6		5	
N 1190 E 465	-11/7-	6	0		
N 1190 E 465	-11/7-	24	0.000351		
N 1190 E 1165	-11/12-	6		10	
N 1200 E 207	-11/8-	6 A	0.016912		Field Duplicate
N 1200 E 207	-11/8-	6 B	0.001853		Field Duplicate
N 1200 E 207	-11/8-	18 A	0		
N 1200 E 225	-11/13-	6	0.013128		
N 1200 E 250	-11/8-	6		0	
N 1200 E 293	-11/7-	6		< 1	
N 1200 E 293	-11/7-	72	0		
N 1200 E 300	-11/7-	6		0	
N 1200 E 425	-11/7-	6		< 1	Lab Duplicate
N 1200 E 425	-11/7-	6		0	Lab Duplicate
N 1200 E 600	-11/5-	6	0.000244		
N 1200 E 800	-11/6-	6	1.08794		
N 1200 E 1200	-11/7-	6	0.00241		Lab Duplicate
N 1200 E 1200	-11/7-	6	0		Lab Duplicate
N 1200 E 1292	-11/7-	6	0		
N 1224 E 320	-11/13-	6 A		0	Field Duplicate
N 1224 E 320	-11/13-	6 B		0	Field Duplicate
N 1238 E 1000	-11/12-	6		0	Lab Duplicate
N 1238 E 1000	-11/12-	6		0	Lab Duplicate
N 1250 E 208	-11/8-	6	0		
N 1250 E 225	-11/8-	6	0.002724		
N 1250 E 225	-11/8-	24	0.000974		
N 1250 E 250	-11/8-	6		20	Lab Duplicate

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

ABD 001 0020

Table 2-1. Analytical Results Summary - New Vernon Road

Grid Point	Sampling Date	Depth (Inches)	Analytical Technique		Comments
			TEM % Asbestos	PLM % Asbestos	
N 1250 E 250	-11/8-	6		5	Lab Duplicate
N 1250 E 300	-11/7-	6	0		
N 1250 E 300	-11/7-	24	0.053087		Lab Duplicate
N 1250 E 300	-11/7-	24	0.000146		Lab Duplicate
N 1250 E 350	-11/6-	6	0		
N 1250 E 390	-11/7-	6	0		
N 1250 E 400	-11/6-	6	0.000481		
N 1250 E 450	-11/7-	6	0		
N 1250 E 450	-11/7-	24	0.000334		
N 1250 E 500	-11/5-	6	0		
N 1250 E 800	-11/12-	6	0		
N 1250 E 900	-11/12-	6		0	
N 1250 E 1550	-11/8-	6	0		
N 1300 E 206	-11/8-	6	0.00077		
N 1300 E 206	-11/8-	18	0		
N 1300 E 225	-11/8-	6	0.00182		
N 1300 E 250	-11/8-	6	0		
N 1300 E 300	-11/6-	6	0		Lab Duplicate
N 1300 E 300	-11/6-	6	0		Lab Duplicate
N 1300 E 300	-11/7-	6	0		Rig
N 1300 E 327	-11/13-	6	0		
N 1300 E 350	-11/6-	6	0		Lab Duplicate
N 1300 E 350	-11/6-	6	0		Lab Duplicate
N 1300 E 400	-11/7-	6	0.017067		
N 1300 E 400	-11/7-	48	0		
N 1300 E 462	-11/7-	6	0.000127		
N 1300 E 600	-11/5-	6	0.000448		Lab Duplicate
N 1300 E 600	-11/5-	6	0		Lab Duplicate
N 1300 E 1100	-11/7-	6	0		
N 1300 E 1200	-11/7-	6	0.000209		
N 1300 E 1200	-11/7-	18	0		
N 1300 E 1300	-11/7-	6	0		

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy
 TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

Table 2-1. Analytical Results Summary – New Vernon Road

Grid Point	Sampling Date	Depth (Inches)	Analytical Technique		Comments
			TEM % Asbestos	PLM % Asbestos	
N 1300 E 1500	-11/8-	6	0		
N 1300 E 1550	-11/8-	6	0		
N 1300 E 1600	-11/8-	6	0		
N 1327 E 379	-11/7-	6	0		
N 1327 E 379	-11/7-	24	0.001345		
N 1338 E 350	-11/7-	6	0		
N 1350 E 210	-11/8-	6	0.00325		
N 1350 E 225	-11/8-	6	0.003841		
N 1350 E 250	-11/8-	6		0	
N 1350 E 300	-11/7-	6	0		
N 1350 E 400	-11/8-	6	0		
N 1350 E 466	-11/7-	6	0		
N 1350 E 466	-11/7-	24	0		
N 1352 E 1300	-11/7-	6	0		
N 1375 E 1100	-11/7-	6	0		
N 1375 E 1200	-11/7-	6	0		
N 1400 E 225	-11/8-	6	0.000471		
N 1400 E 225	-11/8-	24	0		
N 1400 E 250	-11/8-	6	0.001234		
N 1400 E 341	-11/7-	6	0.000741		
N 1400 E 341	-11/7-	24	0		
N 1400 E 419	-11/7-	6	0		
N 1400 E 900	-11/12-	6		0	
N 1400 E 1000	-11/7-	6	0		
N 1410 E 510	-11/7-	6	0.013299		
N 1415 E 231	-11/8-	6	0.002298		
N 1415 E 231	-11/8-	24	0.001940		
N 1419 E 300	-11/7-	6		0	
N 1420 E 450	-11/8-	6	0.000414		
N 1425 E 250	-11/8-	6		< 1	
N 1425 E 400	-11/8-	6	0.003126		

PLM – Polarized Light Microscopy; TEM – Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

Table 2-1. Analytical Results Summary - New Vernon Road

Grid Point	Sampling Date	Depth (Inches)	Analytical Technique		Comments
			TEM % Asbestos	PLM % Asbestos	
N 1440 E 300	-11/6-	6	0.088587		
N 1445 E 695	-11/7-	6	0		Lab Duplicate
N 1445 E 695	-11/7-	6	0		Lab Duplicate
N 1450 E 250	-11/6-	6		< 1	
N 1450 E 600	-11/7-	6	0		Lab Duplicate
N 1450 E 600	-11/7-	6	0		Lab Duplicate
UNKNOWN - 1	-11/7-	6		20	
UNKNOWN - 2	-11/9-	6		50	Lab Duplicate
UNKNOWN - 2	-11/9-	6		40	Lab Duplicate
UNKNOWN - 3 -	-11/12-	6		0	
Total Number of Analyses			TEM	PLM	
			189	41	

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

ABD 001 0023

Of the 28 data points presented in this subset, 15 were situations where asbestos was found in the surface sample (0 to 6 inches) but not in the subsurface sample (usually the 6 to 18 inch interval). For 6 of the data points, asbestos was found in both the surface and subsurface sample. In all but one of these instances, the higher concentration was present in the surface sample. There were 6 instances when asbestos was found in the subsurface but not at the surface.

Alliance collected four samples to represent native soils as background samples. Each of these samples were analyzed by TEM. None of the samples contained detectable amounts of asbestos. Offsite samples were collected to determine background asbestos content in naturally occurring soils in the area. The following describes the sample location for the background soil samples:

- NW Uplands - 2.6 miles from intersection of New Vernon Road and New Vernon Road, just beyond Mary Knoll Drive on the west side of the street.
- NW Wetlands - 1.3 miles from the intersection of New Vernon Road and New Vernon Road, on the west side of the street.
- NW Uplands - In wooded areas between 542 and 580 Meyersville Road.
- Wetlands - In a wooded swampy area adjacent to 26 Maple Road, approximately 150 yards from the road.

These locations were selected because they were upwind and upgradient from the site being investigated. These locations were judged by Alliance geologists to be the best available points for characterizing background samples.

During the investigation at the New Vernon Road Site, Alliance collected three samples that were unlike any of the soil/waste samples encountered previously. These samples were labeled as Unknown #1, Unknown #2 and Unknown #3. The following is a brief description of the location and physical characteristics of these unknowns.

- Unknown #1 Encountered between 6 to 8 feet subsurface at grid interval [N1300, E467]. It was a white tile-like material. However, unlike previous tiles that were located at this site that resembled house tiles, this material was similar to ceiling tiles (20% asbestos).
- Unknown #2 Encountered between 0 to 2 feet subsurface at a grid interval [N1100, E560]. This tile-like material resembled wall board, but much softer than other tiles found (50% asbestos).

Table 2-2. Fiber Dimensions for TEM Detected Asbestos - New Vernon Road

Grid Point	Sampling Date	Depth (inches)	Asbestos %	Dimensions (μm)			Structures Observed		
				Chrysotile			Mass *	Fibers	Bundles
N 800 E 250	-11/5-	6	0.007253	8.0	0.12	0.10	24.96	0	1
N 800 E 800	-11/6-	6	0.000358	0.5	0.10	0.10	1.30	0	1
N 900 E 250	-11/5-	6	0.001381	1.0	0.10	0.10	5.20	0	2
N 900 E 300	-11/5-	6	0.002970	1.2	0.00	0.15	10.80	0	1
N 900 E 350	-11/5-	6 A	0.000364	0.5	0.10	0.10	1.30	0	1
N 900 E 350	-11/5-	6 B	0.004047	1.3	0.10	0.09	14.72	0	5
N 900 E 450	-11/5-	6	0.000917	1.5	0.07	0.06	3.28	0	2
N 900 E 500	-11/13-	6	0.000598	1.1	0.07	0.06	1.98	0	2
N 900 E 550	-11/9-	6	0.001201	1.5	0.10	0.10	3.90	0	0
N 900 E 1300	-11/7-	6	0.000858	1.2	0.10	0.10	3.12	0	1
N 1000 E 250	-11/5-	6	0.000938	0.9	0.10	0.08	3.23	0	2
N 1000 E 300	-11/5-	6	0.003281	2.2	0.08	0.08	11.08	1	2
N 1000 E 350	-11/5-	6	0.005827	2.1	0.09	0.09	25.35	1	5
N 1000 E 600	-11/5-	6	0.013651	2.6	0.09	0.08	52.30	4	6
N 1000 E 600	-11/5-	18	1.052410	47.4	0.17	0.12	3622	0	23
N 1000 E 900	-11/6-	6	0.000235	0.7	0.08		0.91	1	0
N 1000 E 1000	-11/6-	6	0.000190	0.5	0.08	0.07	0.73	0	1
N 1000 E 1100	-11/6-	6	0.421462	18.9	0.13	0.10	1450	6	18

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

* Mass units are picograms.

Table 2-2 (continued)

Table 2-2. Fiber Dimensions for TEM Detected Asbestos - New Vernon Road

Grid Point	Sampling Date	Depth (Inches)	Asbestos %	Dimensions (μm)			Structures Observed		
				Chrysotile			Mass *	Fibers	Bundles
Length	Width	Thickness							
N 1000 E 1275	-11/7-	6	0.348931	8.1	0.23	0.16	1178	5	10
N 1037 E 550	-11/8-	18 A	1.048996	33.6	0.23	0.13	3474	3	19
N 1062 E 429	-11/9-	6	0.000471	0.6	0.10	0.10	1.56	0	1
N 1095 E 300	-11/5-	6	0.030189	4.7	0.10	0.09	103.90	1	8
N 1100 E 250	-11/5-	6 A	0.001021	1.2	0.09	0.08	3.98	0	2
N 1100 E 250	-11/5-	18 A	0.000196	1.3	0.05	0.04	0.68	0	1
N 1100 E 300	-11/5-	6	0.002288	3.2	0.10	0.10	8.32	0	1
N 1100 E 560	-11/9-	24	0.335926	19.9	0.12	0.12	1178	6	11
N 1100 E 600	-11/5-	6	0.288803	1.0	0.17	0.13	1013	1	15
N 1100 E 1250	-11/7-	6	0.002542	2.0	0.10	0.10	10.40	0	2
N 1140 E 358	-11/6-	18	0.099888	4.1	0.15	0.12	343.77	2	6
N 1150 E 207	-11/6-	18 A	0.011450	4.1	0.10	0.09	40.89	0	4
N 1150 E 300	-11/6-	18	0.010848	2.5	0.10	0.10	38.74	1	5
N 1150 E 450	-11/7-	6	0.032446	5.3	0.08	0.09	143.27	2	10
N 1150 E 1550	-11/8-	6	0.001233	2.0	0.10		4.08	1	0
N 1190 E 465	-11/7-	24	0.000351	0.5	0.10	0.10	1.30	1	0
N 1200 E 207	-11/8-	6 A	0.016912	3.4	0.08	0.07	58.20	1	9
N 1200 E 207	-11/8-	6 B	0.001853	1.4	0.07	0.06	6.26	0	4

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

* Mass units are picograms.

Table 2-2 (continued)

Table 2-2. Fiber Dimensions for TEM Detected Asbestos – New Vernon Road

Grid Point	Sampling Date	Depth (inches)	Asbestos %	Dimensions (μm)			Structures Observed		
				Chrysotile			Mass *	Fibers	Bundles
N 1200 E 225	-11/13-	6	0.013128	1.4	0.10	0.10	44.33	3	10
N 1200 E 600	-11/5-	6	0.000244	0.9	0.07	0.06	0.98	0	1
N 1200 E 800	-11/6-	6	1.087940	21.7	0.22	0.14	4239	0	23
N 1200 E 1200	-11/7-	6	0.002410	1.4	0.08	0.08	8.45	0	3
N 1250 E 225	-11/8-	6	0.002724	1.5	0.08	0.06	8.84	3	2
N 1250 E 225	-11/8-	24	0.000974	1.1	0.09	0.06	3.35	1	1
N 1250 E 300	-11/7-	24	0.053087	17.8	0.09	0.08	182.70	0	5
N 1250 E 300	-11/7-	24	0.000146	1.3	0.04	0.04	0.51	0	1
N 1250 E 400	-11/6-	6	0.000481	1.0	0.07	0.05	1.78	1	1
N 1250 E 450	-11/7-	24	0.000334	1.5	0.06	0.05	1.17	0	1
N 1300 E 206	-11/8-	6	0.000770	0.9	0.09	0.10	2.55	1	1
N 1300 E 225	-11/8-	6	0.001820	2.5	0.10	0.10	6.50	0	1
N 1300 E 400	-11/7-	6	0.017067	2.5	0.08	0.08	58.74	2	9
N 1300 E 462	-11/7-	6	0.000127	0.5	0.07	0.06	0.55	0	1
N 1300 E 600	-11/5-	6	0.000448	1.6	0.07	0.06	1.75	0	1
N 1300 E 1200	-11/7-	6	0.000209	1.7	0.05	0.04	0.88	0	1
N 1327 E 379	-11/7-	24	0.001345	3.6	0.08	0.07	5.24	0	1
N 1350 E 210	-11/8-	6	0.003250	1.1	0.09	0.09	10.76	0	5

PLM – Polarized Light Microscopy; TEM – Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

* Mass units are picograms.

Table 2-2 (continued)

Table 2-2. Fiber Dimensions for TEM Detected Asbestos - New Vernon Road

Grid Point	Sampling Date	Depth (inches)	Asbestos %	Dimensions (μ m)			Structures Observed		
				Chrysotile			Mass *	Fibers	Bundles
				Length	Width	Thickness			
N 1350 E 225	-11/8-	6	0.003841	3.4	0.09	0.10	12.72	1	1
N 1400 E 225	-11/8-	6	0.000471	0.6	0.10	0.10	1.56	0	1
N 1400 E 250	-11/8-	6	0.001234	1.1	0.09	0.09	4.09	0	2
N 1400 E 341	-11/7-	6	0.000741	0.9	0.08	0.05	2.84	1	1
N 1410 E 510	-11/7-	6	0.013299	4.1	0.09	0.09	52.68	0	5
N 1415 E 231	-11/8-	6	0.002298	1.4	0.09	0.08	8.36	1	2
N 1415 E 231	-11/8-	24	0.001940	2.1	0.12	0.10	6.55	0	1
N 1420 E 450	-11/6-	6	0.000414	0.6	0.00	0.10	1.80	0	1
N 1425 E 400	-11/6-	6	0.003126	1.5	0.09	0.09	13.40	0	4
N 1440 E 300	-11/6-	6	0.088587	6.7	0.10	0.09	316.38	1	16
Averages			0.078980	4.3	0.10	0.09	278.79	1	4
Standard Deviation			0.234260	8.0	0.04	0.03	832.80	1	6
Number of Measurements			64	64	64	62	64	64	64
Maximum			1.087940	47.4	0.23	0.16	4238.73	6	23
Minimum			0.000127	0.5	0.00	0.04	0.51	0	0

PLM - Polarized Light Microscopy; TEM - Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

* Mass units are picograms.

**Table 2-3. Analytical Results Summary – New Vernon Road
Detected in the Surface and/or Subsurface**

Grid Point	Sampling Date	Depth (Inches)	Analysis by	Asbestos (%)	Asbestos Detected		
					In Surface Only	In Subsurface Only	Surface & Subsurface
N 900 E 250	-11/5-	6	TEM	0.001381	X		
N 900 E 250	-11/5-	18	TEM	0			
N 900 E 350	-11/5-	6 A	TEM	0.000364	X		
N 900 E 350	-11/5-	6 B	TEM	0.004047			
N 900 E 350	-11/5-	18 A	TEM	0			
N 1000 E 250	-11/5-	6	TEM	0.000938	X		
N 1000 E 250	-11/5-	18	TEM	0			
N 1000 E 250	-11/5-	18	TEM	0			
N 1000 E 350	-11/5-	6	TEM	0.005827	X		
N 1000 E 350	-11/5-	18	TEM	0			
N 1000 E 600	-11/5-	6	TEM	0.013651			X
N 1000 E 600	-11/5-	18	TEM	1.052410			
N 1037 E 550	-11/8-	6 A	PLM	20			X
N 1037 E 550	-11/8-	6 B	PLM	20			
N 1037 E 550	-11/8-	18 A	TEM	1.048996			
N 1062 E 429	-11/9-	6	TEM	0.000471	X		
N 1062 E 429	-11/9-	6	TEM	0			
N 1062 E 429	-11/9-	24	TEM	0			
N 1100 E 250	-11/5-	6 A	TEM	0.001021			X
N 1100 E 250	-11/5-	18 A	TEM	0.000196			
N 1100 E 560	-11/9-	6	PLM	< 1			X
N 1100 E 560	-11/9-	24	TEM	0.335926			
N 1140 E 358	-11/6-	18	TEM	0.099888		X	
N 1150 E 207	-11/6-	6 A	TEM	0			
N 1150 E 207	-11/6-	6 B	TEM	0			
N 1150 E 207	-11/6-	18 A	TEM	0.011450		X	
N 1150 E 300	-11/6-	18	TEM	0.010848		X	
N 1150 E 700	-11/12-	6	PLM	< 1	X		
N 1150 E 700	-11/12-	24	TEM	0			
N 1173 E 322	-11/8-	6	PLM	< 1	X		
N 1173 E 322	-11/8-	72	TEM	0			
N 1190 E 465	-11/7-	6	TEM	0		X	
N 1190 E 465	-11/7-	24	TEM	0.000351			

PLM – Polarized Light Microscopy; TEM – Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

**Table 2-3. Analytical Results Summary – New Vernon Road
Detected in the Surface and/or Subsurface**

Grid Point	Sampling Date	Depth (inches)	Analysis by	Asbestos (%)	Asbestos Detected		
					In Surface Only	In Subsurface Only	Surface & Subsurface
N 1200 E 207	-11/8-	6 A	TEM	0.016912	X		
N 1200 E 207	-11/8-	6 B	TEM	0.001853			
N 1200 E 207	-11/8-	18 A	TEM	0			
N 1200 E 293	-11/7-	6	PLM	< 1	X		
N 1200 E 293	-11/7-	72	TEM	0			
N 1200 E 425	-11/7-	6	PLM	< 1	X		
N 1200 E 425	-11/7-	6	PLM	0			
N 1250 E 225	-11/8-	6	TEM	0.002724			X
N 1250 E 225	-11/8-	24	TEM	0.000974			
N 1250 E 300	-11/7-	6		0			
N 1250 E 300	-11/7-	24	TEM	0.053087			
N 1250 E 300	-11/7-	24	TEM	0.000146			
N 1250 E 450	-11/7-	6	TEM	0		X	
N 1250 E 450	-11/7-	24	TEM	0.000334			
N 1300 E 206	-11/8-	6	TEM	0.000770	X		
N 1300 E 206	-11/8-	18	TEM	0			
N 1300 E 400	-11/7-	6	TEM	0.017067	X		
N 1300 E 400	-11/7-	48	TEM	0			
N 1300 E 1200	-11/7-	6	TEM	0.000209	X		
N 1300 E 1200	-11/7-	18	TEM	0			
N 1327 E 379	-11/7-	6	TEM	0		X	
N 1327 E 379	-11/7-	24	TEM	0.001345			
N 1400 E 225	-11/8-	6	TEM	0.000471	X		
N 1400 E 225	-11/8-	24	TEM	0			
N 1400 E 341	-11/7-	6	TEM	0.000741	X		
N 1400 E 341	-11/7-	24	TEM	0			
N 1415 E 231	-11/8-	6	TEM	0.002298			X
N 1415 E 231	-11/8-	24	TEM	0.001940			
Totals					15	6	6

PLM – Polarized Light Microscopy; TEM – Transmission Electron Microscopy

TEM Method detection limit is 0.5 %. PLM detection Limit is 1 %

Unknown #3 Encountered between 20 to 24 inches subsurface at grid interval [N1100, E560]. This material was a milk white semi-solid matrix. (No asbestos)

2.2 Ground Penetrating Radar (GPR)

2.2.1 Objective

A GPR survey was performed at the New Vernon Road Site to determine the vertical and lateral extent of the asbestos fill material. Although GPR does not allow detection of asbestos containing material, the GPR method is useful for differentiating between naturally bedded material (soils, sand, clay, and peat deposits), and non-natural occurring exotic material dumped at this site composed primarily of asbestos tiles. The purpose of the GPR survey was to assist in identifying the uppermost fill areas. Alliance also used the GPR data to assist in the selection of optimum locations for subsurface borings.

2.2.2 GPR Methodology

The GPR method imparts an electromagnetic radar impulse directed vertically downward into the ground. The radar signal travels through the earth until it reaches material with a contrasting dielectric constant. Whenever a boundary between two materials of differing dielectric constant is reached, a portion of the radar signal is reflected back to a detector at the surface. The result of a GPR survey is a continuous subsurface profile which may be used to interpolate between known points of control such as borings.

The depth to which GPR signals are capable of penetrating varies from location to location. Depth of penetration is generally controlled by the conductivity of the subsurface material. Highly conductive materials such as metal or even moist clay, are usually very reflective and permit very little radar signal to pass through. Asbestos is not a highly conductive material, and therefore, does not attenuate the GPR signal significantly. The high clay content in the native topsoil and underlying sediments at this site provided significant signal attenuation in certain locations. In locations where the topsoil cover was over 1 to 2 feet, the GPR signal was unable to penetrate beyond the upper 2 to 3 feet of surficial material.

2.2.3 Survey Extent

Figure 2-1 shows the locations of GPR profile traverses collected for the site. A total of 2500 linear feet of GPR data were collected using a 300 MHz antenna at the site. The radar unit was towed by hand at approximately 1 to 2 feet per second (walking pace). The recording time for each GPR trace was 90 nanoseconds.

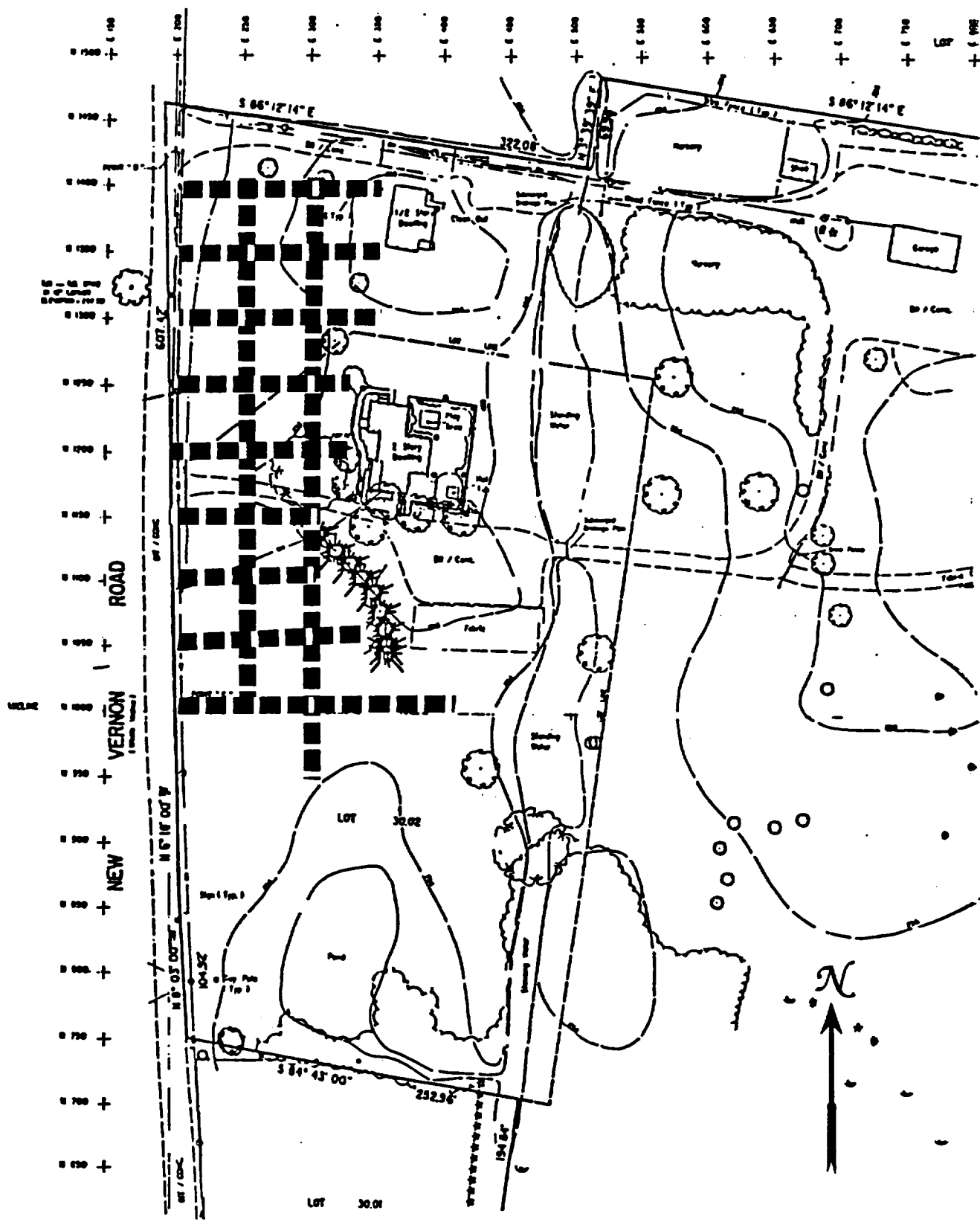


Figure 2-1 GPR Survey Traverses

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2.2.4 Data Processing

Due to the desire for high resolution profiling, the GPR data were reprocessed using gain, deconvolution, and band pass filtering. This combination of signal processing steps sharpens the GPR image and allows more refined interpretation of the subsurface image. The reprocessing was performed using Radan (Version 3.0) software, which is the industry standard processing software. Limited reprocessing was performed at the end of each field day to ensure that the data were useful.

2.2.5 Results

The raw GPR data from the New Vernon Road Site were interpreted immediately after the field survey to identify subsurface utility lines and to determine a preliminary interpretation of the thickness and extent of the fill material. This field map was then used to position soil borings. Since the GPR signal was not able to penetrate the highly conductive, clay-rich topsoil at certain locations, the interpretation based on GPR data was inadequate for determining the thickness and extent of the asbestos fill material. The GPR data did provide sufficient information for determining priority soil boring locations.

The GPR data were not utilized to estimate the volume of the asbestos fill material, since adequate borings were available across the entire surveyed area.

2.3 Air Monitoring Summary

Table 2-4 is a tabulated presentation of the air monitoring results generated during this assignment. Figure 2-2 shows approximate locations for air sampling. Results for the area samples ranged from 0 to 0.004 fibers per cubic centimeter (cc). Results for samples collected as part of the personal sampling ranged from 0.004 to 0.063 fibers per cc. Presently, there is not a standard for asbestos in ambient air. There is an occupational standard of 0.1 fiber/cc (based on an 8-hour time weighted average), however, it is not directly applicable to this site. That standard was intended for indoor remediation activities. This data was generated for health and safety purposes, only. It is not recommended that this data be used for any type of modeling or emission estimates.

2.4 Summary of Quality Control Measures

The QAPjP developed for this Work Assignment outlined various QC procedures to be implemented during the field, laboratory, and data reporting components. The following subsections further define and, where appropriate, report calculated results of the QC measures.

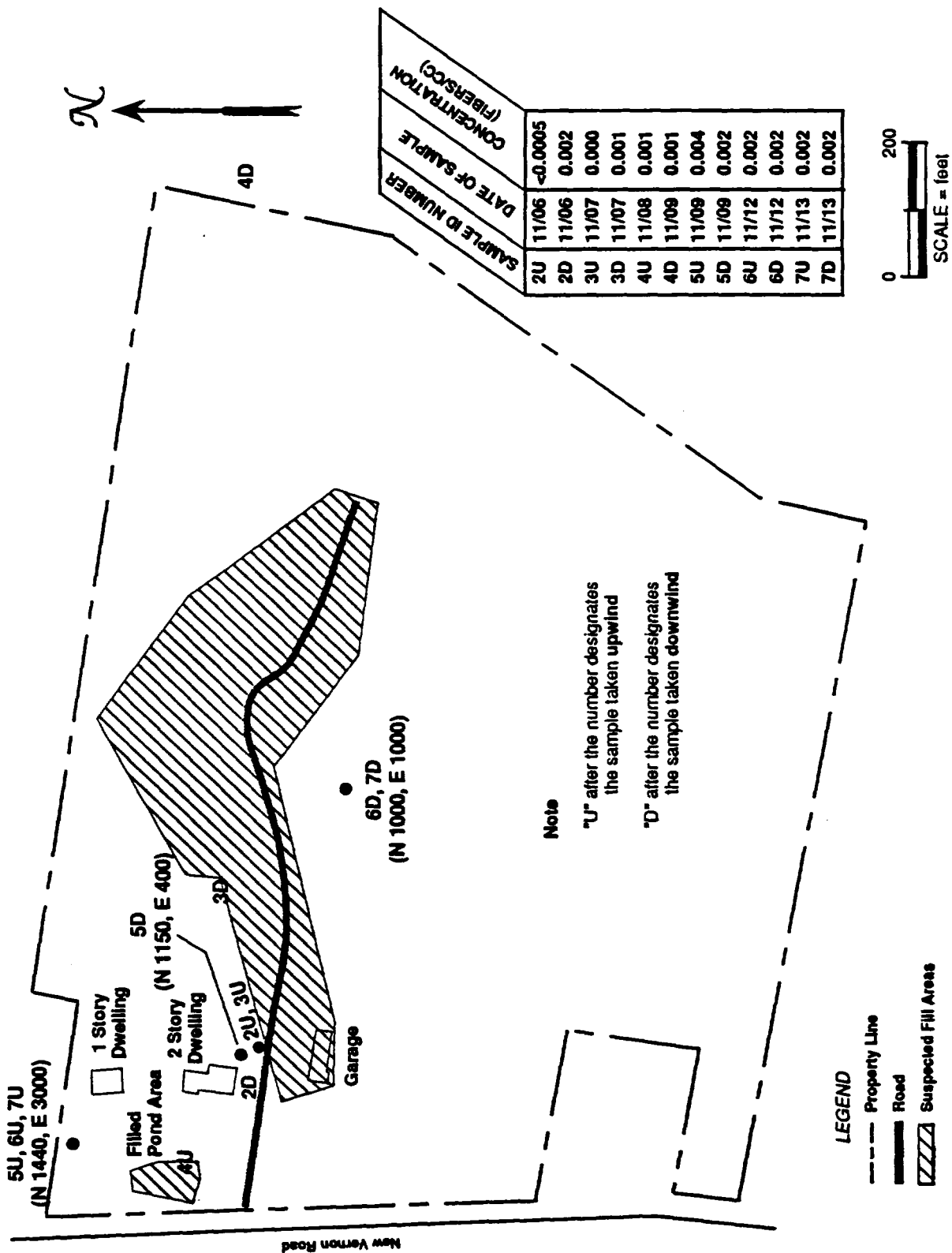


Figure 2-2. Approximate locations for air sampling.

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Table 2-4. Air Monitoring Results at the New Vernon Road Site

Date	Type of Sample	Sample I.D.	Sample Location	Sampling Period	Volume Collected (liters)	Fiber Load (per sq. mm)	Concentration (fibers/cc)	Detection Limits (fibers/cc)
Nov. 5	Area	AMB-11/5-UP	Upwind	1135 - 1633	524	2.546	0.002	0.0009
		AMB-11/5-DN	Downwind	1329 - 1639	1662	3.820	0.001	0.0003
	Personal	AMB-11/5-01	Rick R.	1335 - 1645	298	0.000	<0.0016	0.0016
		AMB-11/5-01 (Dup.)	Rick R.	1335 - 1645	298	0.000	<0.0016	0.0016
		AMB-11/5-FB1	Field Blank	NA	0	0.000	(a)	0
		AMB-11/5-FB2	Field Blank	NA	0	0.000	(a)	0
Nov. 6	Area	AMB-11/6-UP	Upwind	0830 - 1730	1080	0.000	<0.0005	0.0005
		AMB-11/6-DN	Downwind	0830 - 1730	1080	5.093	0.002	0.0005
	Personal	AMB-11/6-01	Tom L.	1400 - 1700	360	3.820	0.004	0.0014
		AMB-11/6-02	Rick R.	1400 - 1700	360	14.006	0.015	0.0014
		AMB-11/6-03	Fred M.	1400 - 1700	360	11.459	0.012	0.0014
		AMB-11/6-FB1	Field Blank	NA	0	1.273	(a)	0
		AMB-11/6-FB2	Field Blank	NA	0	0.000	(a)	0
		AMB-11/6-FB2 (Dup.)	Field Blank	NA	0	11.459	(a)	0
Nov. 7	Area	AMB-11/7-UP	Upwind	0800 - 1700	1080	1.273	0.000	0.0005
		AMB-11/7-DN	Downwind	0800 - 1700	1080	3.820	0.001	0.0005
	Personal	AMB-11/7-01	Lindsey C.	1400 - 1700	360	33.104	0.035	0.0014
		AMB-11/7-02	Maria D.	1400 - 1700	360	10.186	0.011	0.0014
		AMB-11/7-02 (Dup.)	Maria D.	1400 - 1700	360	7.639	0.008	0.0014
		AMB-11/7-FB1	Field Blank	NA	0	1.273	(a)	0
		AMB-11/7-FB2	Field Blank	NA	0	1.273	(a)	0
Nov. 8	Area	AMB-11/8-UP	Upwind	0905 - 1719	869	1.273	0.001	0.0006
		AMB-11/8-DN	Downwind	0830 - 1725	803	1.273	0.001	0.0006
	Personal	AMB-11/8-01	Rick R.	0949 - 1225				
				1425 - 1720	520	85.723	0.063	0.0009
		AMB-11/8-01 (Dup.)	Rick R.	0949 - 1225				
				1425 - 1720	520	80.680	0.060	0.0009
		AMB-11/8-02	Tom L.	0850 - 1205				
				1409 - 1715	480	13.867	0.011	0.001
		AMB-11/8-03	Phil M.	0901 - 1200				
				1410 - 1715	622	27.734	0.017	0.0008
		AMB-11/8-03 (Dup.)	Phil M.	0901 - 1200				
				1410 - 1715	622	30.255	0.019	0.0008
		AMB-11/8-FB1	Field Blank	NA	0	0.000	(a)	0
		AMB-11/8-FB2	Field Blank	NA	0	1.273	(a)	0

(a) Field blanks have no sample volume; results expressed as total fiber load (fibers/sq. mm)

(b) Triplicate analyses of this sample conducted for QC purposes.

Sampling Method: NIOSH 7400; Analytical Method: Phase Contrast Microscopy

Table 2-4. Air Monitoring Results at the New Vernon Road Site

Date	Type of Sample	Sample I.D.	Sample Location	Sampling Period	Volume Collected (liters)	Fiber Load (per sq. mm)	Concentration (fibers/cc)	Detection Limits (fibers/cc)
Nov. 9	Area	AMB-11/9-UP	Upwind	1000 - 1345	396	3.820	0.004	0.0012
		AMB-11/9-DN	Downwind	1000 - 1355	325.5	1.273	0.002	0.0015
	Personal	AMB-11/9-01	Phil M.	0955 - 1100	102	1.273	0.005 (b)	0.0048
		AMB-11/9-01 (Dup.)	Phil M.	0955 - 1100	102	2.546	0.01	0.0048
		AMB-11/9-FB1	Field Blank	NA	0	1.273	(a)	0
		AMB-11/9-FB2	Field Blank	NA	0	0.000	(a)	0
Nov. 1	Area	AMB-11/12-UP	Upwind	0955 - 1643	726.2	3.820	0.002	0.0007
		AMB-11/12-DN	Downwind	1000 - 11639	670	3.820	0.002	0.0007
	Personal	AMB-11/12-01	Rick R.	1112 - 1321				
				1420 - 1626	436	17.649	0.016 (b)	0.0011
		AMB-11/12-01 (Dup.)	Rick R.	1112 - 1321				
				1420 - 1626	436	15.128	0.013	0.0011
		AMB-11/12-FB1	Field Blank	NA	0	7.639	0.007	0.0011
		AMB-11/12-FB2	Field Blank	NA	0	0.000	(a)	0
Nov. 1	Area	AMB-11/13-UP	Upwind	1026 - 1637	649	3.820	0.002	0.0008
		AMB-11/13-DN	Downwind	1031 - 1645	632	2.546	0.002	0.0008
	Personal	AMB-11/13-01	Rick R.	1043 - 1220	166	5.093	0.012	0.003
		AMB-11/13-01 (Dup.)	Rick R.	1043 - 1220	166		0.009	0.003
		AMB-11/13-FB1	Field Blank	NA	0	0.000	(a)	0
		AMB-11/13-FB2	Field Blank	NA	0	0.000	(a)	0

(a) Field blanks have no sample volume; results expressed as total fiber load (fibers/sq. mm)

(b) Triplicate analyses of this sample conducted for QC purposes.

Sampling Method: NIOSH 7400; Analytical Method: Phase Contrast Microscopy

2.4.1 Data Collection and Sampling QC Procedures

Alliance used a field logbook to record all major activities at the site on a daily basis. Borings log sheets were used to record all soil characteristics noted during the sampling effort. These logs were transcribed to a computerized data form so the data could be presented by grid point rather than chronologically. All boring log data was QC reviewed for transcription error.

All samples designated for analysis, were shipped under chain-of-custody to Eastern Analytical Laboratories (EAL). Archived samples were kept at the Alliance Mobile Laboratory in file drawers labelled with chain-of-custody tape. At the end of the field effort, archived samples were returned to Alliance where they are being maintained in a locked room in sealed boxes. EAL maintained a similar chain-of-custody where control numbers were assigned and recorded on the original Alliance chain-of-custody form. EAL also stored their samples in a locked room.

Alliance designed a field strategy that featured three teams of two people. Each day, each team was required to collect a duplicate. The Alliance Field Team Leader then selected two of the three field duplicates for analysis. The third field duplicate was archived.

All data was input to a Lotus spreadsheet for summarizing and manipulation. All input was cross-checked by at least one other person. Any calculations on the spreadsheet were verified by hand as part of the routine QC procedure.

2.4.2 Analytical QC Procedures

All analyses were performed by Eastern Analytical Laboratory. EAL is certified by the National Institute of Standards and Technology (NIST). They have a well defined QC program that features various procedures to assure the generation of valid representative data.

All analysts are required to participate in NIST performance evaluation studies. Other routine QC measures in place include:

- **Interlaboratory Studies:** performance evaluation samples are circulated to other laboratories and the results are tabulated by an independent auditor (quarterly).
- **Duplicate Analyses:** A sample is reanalyzed by the same analyst (or a different analyst) during which the same grid but a different opening is reviewed (1 in 10).
- **Replicate Analyses:** The same as a duplicate except it is the same grid and the same opening (1 in 10).

- **Verified Analysis:** The same sample is reviewed by all analysts and reported to the laboratory manager (weekly, or 1 in 250).
- **Water Control Samples:** Water used for sample preparation is analyzed to assure it is clean (every batch).

Tables 2-5 through 2-7 summarize the results of the field and laboratory duplicates. Of the 31 sets of samples reported, 19 were found to contain no asbestos. Of the remaining 12 sets, 5 were situations where one sample reported zero asbestos and the second sample reported a very low concentration (0.000858 was the highest value reported for a duplicate analysis that compared to a zero).

2.4.3 *Audit Results*

Alliance performed an internal audit during both the field and laboratory component of this Work Assignment. Copies of these audits are provided Appendix E. Alliance has also included applicable audit results from EAL.

2.5 **Data Validation**

Data validation is the process of filtering data and accepting or rejecting it on the basis of sound criteria. For this Work Assignment, all validation was completed by Alliance. Field data validation was based on the use of approved sampling procedures and proper chain-of-custody. No problems were encountered in either of these areas.

Analytical data validation was accomplished by mathematical verification of reported concentrations. Presently there is no EPA guidance for validation of microscopic analyses; therefore, validation procedures were somewhat limited. Alliance requested copies of all original raw data sheets generated by the laboratory in order to calculate concentrations. All reported concentrations were consistent with Alliance's verification calculations.

There was no mechanism for identifying outliers from the data set. Samples were collected across a grid pattern and, in most cases, only a single discrete value was generated. There was no incident where one value could be judged suspicious or questionable when compared to another, even in cases where field or lab duplicates were analyzed.

Alliance could not find justification to delete any data; therefore, this assignment attained completeness of 100%.

Table 2-5. Quality Control Results Summary – Field Duplicates

Grid Point	Sampling Date	Analytical Technique	Depth (inches)	Asbestos (%)	Calculated Difference	Assessment	Dimensions (μm)			Mass (pg)
							Length	Width	Thickness	
N 750 E 300	-11/5-	TEM	6 A	0		No Asbestos Detected				
N 750 E 300	-11/5-	TEM	6 B	0						
N 800 E 1100	-11/7-	TEM	6 A	0		No Asbestos Detected				
N 800 E 1100	-11/7-	TEM	6 B	0						
N 900 E 350	-11/5-	TEM	6 A	0.000364	-0.0037	167% RPD	0.5	0.1	0.1	1.300
N 900 E 350	-11/5-	TEM	6 B	0.004047			1.26	0.1	0.092	14.716
N 900 E 700	-11/6-	TEM	6 A	0		No Asbestos Detected				
N 900 E 700	-11/6-	TEM	6 B	0						
N 900 E 1200	-11/7-	TEM	6 A	0		No Asbestos Detected				
N 900 E 1200	-11/7-	TEM	6 B	0						
N 1037 E 550	-11/8-	PLM	6 A	20	0	0% RPD				
N 1037 E 550	-11/8-	PLM	6 B	20						
N 1100 E 700	-11/9-	PLM	6 A	0		No Asbestos Detected				
N 1100 E 700	-11/9-	PLM	6 B	0						
N 1100 E 900	-11/6-	PLM	6 A	0		No Asbestos Detected				
N 1100 E 900	-11/6-	PLM	6 B	< 1						
N 1128 E 800	-11/12-	PLM	6 A	10	5	67% RPD				
N 1128 E 800	-11/12-	PLM	6 B	5						
N 1200 E 207	-11/8-	TEM	6 A	0.016912	0.0151	161% RPD	3.37	0.076	0.073	58.203
N 1200 E 207	-11/8-	TEM	6 B	0.001853			1.375	0.0725	0.0625	6.256
N 1224 E 320	-11/13-	PLM	6 A	0		No Asbestos Detected				
N 1224 E 320	-11/13-	PLM	6 B	0						

RPD – Relative Percent Difference = $((a-b)/((a+b)/2)) * 100$; Calculated Difference = $(a-b)$

TEM Method Detection Limit is 0.5%; PLM Method Detection Limit is 1%.

Table 2-6. Quality Control Results Summary – Laboratory Duplicates

Grid Point	Sampling Date	Analytical Technique	Depth (inches)	Asbestos (%)	Calculated Difference	Assessment	Dimensions (μm)			Mass (pg)
							Length	Width	Thickness	
UNKNOWN - 2	-11/9-	PLM	6	50	10	22% RPD				
UNKNOWN - 2	-11/9-	PLM	6	40						
N 700 E 1400	-11/8-	TEM	6	0		No Asbestos Detected				
N 700 E 1400	-11/8-	TEM	6	0						
N 800 E 1000	-11/7-	TEM	6	0		No Asbestos Detected				
N 800 E 1000	-11/7-	TEM	6	0						
N 800 E 1100	-11/7-	TEM	6 A	0						
N 900 E 500	-11/13-	TEM	6	0.000598	0.0006	200% RPD	1.05	0.065	0.055	1.981
N 900 E 500	-11/13-	TEM	6	0						
N 900 E 1000	-11/6-	TEM	6	0		No Asbestos Detected				
N 900 E 1000	-11/6-	TEM	6	0						
N 900 E 1300	-11/7-	TEM	6	0	-0.0009	200% RPD				
N 900 E 1300	-11/7-	TEM	6	0.000858			1.2	0.1	0.1	3.120
N 1000 E 250	-11/5-	TEM	18	0		No Asbestos Detected				
N 1000 E 250	-11/5-	TEM	18	0						
N 1062 E 429	-11/9-	TEM	6	0.000471	0.0005	200% RPD	0.6	0.1	0.1	1.560
N 1062 E 429	-11/9-	TEM	6	0						
N 1100 E 350	-11/5-	TEM	6	0		No Asbestos Detected				
N 1100 E 350	-11/5-	TEM	6	0						
N 1100 E 1500	-11/8-	TEM	6	0		No Asbestos Detected				
N 1100 E 1500	-11/8-	TEM	6	0						
N 1100 E 1500	-11/8-	TEM	18	0		No Asbestos Detected				
N 1100 E 1500	-11/8-	TEM	18	0						
N 1200 E 425	-11/7-	PLM	6	< 1		No Asbestos Detected				
N 1200 E 425	-11/7-	PLM	6	0						
N 1200 E 1200	-11/7-	TEM	6	0.00241	0.0024	200% RPD	1.4	0.083	0.076	8.450
N 1200 E 1200	-11/7-	TEM	6	0						

RPD - Relative Percent Difference = $((a-b)/((a+b)/2)) * 100$; Calculated Difference = $(a-b)$

TEM Method Detection Limit is 0.5%; PLM Method Detection Limit is 1%.

Table 2-6. Quality Control Results Summary – Laboratory Duplicates

Grid Point	Sampling Date	Analytical Technique	Depth (inches)	Asbestos (%)	Calculated Difference	Assessment	Dimensions (μm)			Mass (pg)
							Length	Width	Thickness	
N 1238 E 1000	-11/12-	PLM	6	0		No Asbestos Detected				
N 1238 E 1000	-11/12-	PLM	6	0						
N 1250 E 250	-11/8-	PLM	6	20	15	120% RPD				
N 1250 E 250	-11/8-	PLM	6	5						
N 1250 E 300	-11/7-	TEM	24	0.053087	0.0529	199% RPD	17.8	0.086	0.08	182.702
N 1250 E 300	-11/7-	TEM	24	0.000146			1.3	0.04	0.04	0.511
N 1300 E 300	-11/6-	TEM	6	0		No Asbestos Detected				
N 1300 E 300	-11/6-	TEM	6	0						
N 1300 E 350	-11/6-	TEM	6	0						
N 1300 E 350	-11/6-	TEM	6	0						
N 1300 E 600	-11/5-	TEM	6	0.000448	0.0004	200% RPD	1.6	0.07	0.06	1.747
N 1300 E 600	-11/5-	TEM	6	0						
N 1445 E 695	-11/7-	TEM	6	0		No Asbestos Detected				
N 1445 E 695	-11/7-	TEM	6	0						
N 1450 E 600	-11/7-	TEM	6	0		No Asbestos Detected				
N 1450 E 600	-11/7-	TEM	6	0						

RPD – Relative Percent Difference = $((a-b)/((a+b)/2)) * 100$; Calculated Difference = $(a-b)$

TEM Method Detection Limit is 0.5%; PLM Method Detection Limit is 1%.

Table 2-7. TEM Quality Control Sample Comparisons (Detected Quantities Only)

Grid Point	Depth (inches)	Asbestos (%)	Dimensions (μm)			Mass (pg)	Number of	
			Length	Width	Thickness		Fibers	Bundles
N 900 E 350	6 A	0.000364	0.50	0.10	0.10	1.30	0	1
N 900 E 350	6 B	0.004047	1.26	0.10	0.09	14.72	0	5
N 1200 E 207	6 A	0.016912	3.37	0.08	0.07	58.20	1	9
N 1200 E 207	6 B	0.001853	1.38	0.07	0.06	6.26	0	4
N 900 E 500	6	0.000598	1.05	0.07	0.06	1.98	0	2
N 900 E 500	6	0				0	0	0
N 900 E 1300	6	0				0	0	0
N 900 E 1300	6	0.000858	1.20	0.10	0.10	3.12	0	1
N 1062 E 429	6	0.000471	0.60	0.10	0.10	1.56	0	1
N 1062 E 429	6	0				0	0	0
N 1200 E 1200	6	0.00241	1.40	0.08	0.08	8.45	0	3
N 1200 E 1200	6	0				0	0	0
N 1250 E 300	24	0.053087	17.80	0.09	0.08	182.70	0	5
N 1250 E 300	24	0.000146	1.30	0.04	0.04	0.511	0	1
N 1300 E 600	6	0.000448	1.60	0.07	0.06	1.75	0	1
N 1300 E 600	6	0				0.00	0	0

TEM Method Detection Limit is 0.5%

2.6 Data Limitations

The analytical results were reported on a percent basis. Duplicate analyses actually showed very good agreement when compared to each other, as all results were within 0.02 weight percent asbestos of each other. Nearly all TEM results were below the statistical quantitation limit. The relative percent differences cited in Tables 2-5 and 2-6 can be a misleading presentation of the precision of the analyses performed. It must be recognized in cases where 200% RPD is reported, one value is reported as zero. Further scrutiny of the instances where a zero value is being compared shows only a single structure was observed to yield a calculated mass of less than 1.5 picograms.

Variation in the quality control samples can be attributed to two possible sources:

1. Heterogeneity of the sample
2. Analyses conducted at or below the statistical limit of quantitation

The samples consisted of pieces of asbestos-rich material of variable friability in a soil matrix. There was no effort to pulverize or homogenize the whole, as received sample. To do so may have affected the integrity of the fibers or bundles within the sample. Therefore, aliquots of the sample were carefully selected with bias toward suspected material in hopes of providing results on a "worst-case basis". A second consideration is with regard to the small number of asbestos particles actually counted. In many instances, only single-digit numbers of particles were observed. Under these circumstances, a variation of only a few particles or the length of one fiber (e.g., 0.5 microns versus 10 microns) can result in a huge percentage variation in the results. What this means is that these analyses are at or below the statistical limit for reliable quantitation. Therefore, the results should be considered semi-quantitative or qualitative in nature when measured below 0.5%.

2.6.1 Detection Limits

Polarized Light Microscopy (PLM) is the EPA recommended method of determining asbestos in bulk samples. It will be used if visual observations indicate the presence of suspected asbestos material. The detection limit of PLM is 1.0%.

Transmission Electron Microscopy (TEM) will be used on samples which asbestos material is not apparent, but have been determined by the geologist to be fill (not native soil), and on all surface (0 to 6 inches) samples that do not show visible evidence of asbestos. The detection limit of TEM is 0.5%.

The analytical method used for air sampling is Phase Contrast Microscopy (PCM), and the sampling method in NIOSH 7400. The detection limit varies with the volume of air sampled. The detection limit range for monitors worn by people is 0.0008 to 0.0030 fibers/cc. Ranges for samples taken upwind and downwind of the borings are 0.0005 to 0.0015 fibers/cc.

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3.0 NATURE AND EXTENT OF CONTAMINATION

Soil borings were taken at several locations at the New Vernon Road Site to determine the vertical and lateral extent of asbestos contamination. While laboratory analyses were only performed for surface and shallow subsurface soil samples, field identification of probable asbestos containing material (ACM) was performed based on whether the observed material appeared to be native soil or fill. This identification was straightforward in the field, since the fill material consisted of tiles, shingles, and wallboard slurry. None of this material could be confused with native soil.

It is possible, however, that material identified in the field as native soil, may indeed contain some amount of asbestos. This is especially true for surface soil and sediments bordering the filled debris mass. Therefore, the maps and cross-sections presented below represent only preliminary field judgments and are not verified by laboratory analysis. In general, volume estimates made from these field observations should be regarded as minimum amounts since additional ACM may be present, but may have been identified as native soil or sediment.

3.1 Graphic Presentation

Figure 3-1, shows a map of the location of the Cross Sections and thickness of asbestos fill. There are 5 areas of asbestos fill material.

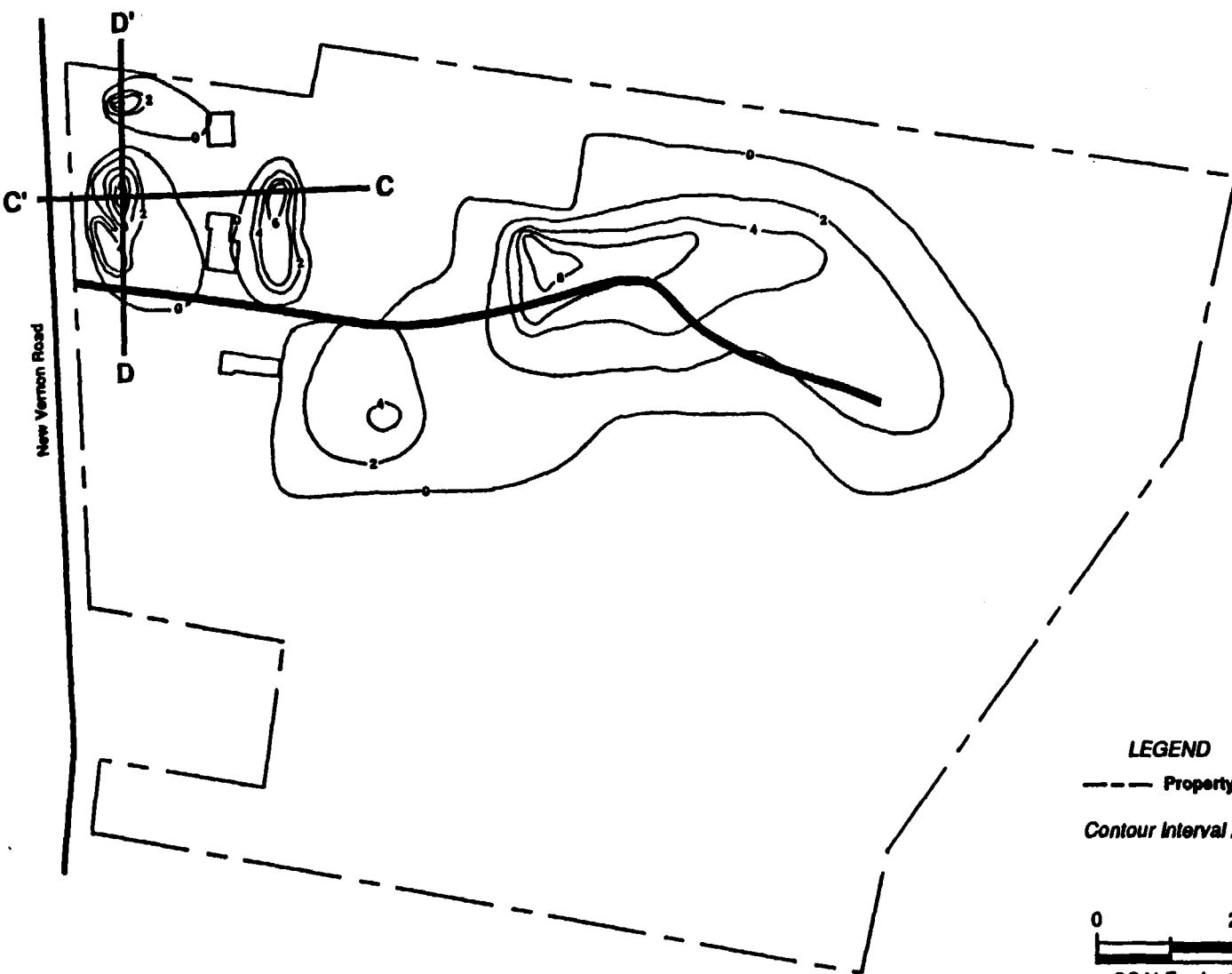
Figure 3-3 shows a graphical boring log from the New Vernon Road Site. This log shows the range of materials which were observed at this site as well as the White Bridge Road Site. Typically, up to 10 inches of topsoil (silt and clay) overlie 0 to 6 feet of asbestos tiles and shingles. A white or light green slurry of foamy, pulpy material occasionally underlies the tiles. The natural sediment under the fill material is typically a grey silty clay which may be weathered to a red-brown color. Some locations are very organic-rich, ranging up to 60% peat.

Figure 3-4 show an east-west and north-south cross-section, across the filled area. These sections show the vertical and lateral extent of the natural and filled materials. The asbestos tile mass ranges from 0 to 8 feet thick, averaging about 4 feet thick. The asbestos fill is buried beneath up to 1 foot of topsoil and up to 2 feet of native sediments which have been emplaced over the fill.



LEGEND
--- Property Line
Contour Interval 2 feet

0 200
SCALE = feet



NY-070.0S1

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ABD 001 0046

Figure 3-1. Thickness of asbestos fill and location of cross sections.



ALLIANCE <small>Technologies Corporation</small>						TEST BORING LOG N 11238, E 1000	
PROJECT: NEW VERNON ROAD						SHEET NO. 1 OF 1	
CLIENT: EPA						JOB NO.	
BORING CONTRACTOR:						DATE STARTED: 11/12/90	
DRILLING METHOD: Split Spoon				CASE	SAMP	CORE	TUBE
TOP OF RISER ELEVATION:				TYPE			
GROUND SURFACE ELEVATION: 234'				DIA.			
DEPTH OF WELL: 10'				WT.			
WATER LEVEL AT COMPLETION:				FALL			
							DATE FINISHED:
							DRILLER:
							INSPECT.: R. Ramuglia
							SCREEN LENGTH:
							SLOT SIZE:

WELL CONSTRUCTION	DEPTH feet	GRAPHIC LOG	SAMPLE #	BLOWS per 6 inches	CLASSIFICATION	REMARKS
	0	[Pattern: Dotted]			Silty Sand Topsoil	No Well installed
		[Pattern: Horizontal Lines]			Asbestos Tiles	
		[Pattern: Vertical Lines]			Red Styrofoam	
	5	[Pattern: Diagonal Lines]			Brown Silty Sand	
		[Pattern: Dotted]				
		[Pattern: Horizontal Lines]				
		[Pattern: Vertical Lines]				
	10	[Pattern: Diagonal Lines]				
		[Pattern: Dotted]				
		[Pattern: Horizontal Lines]				
	15	[Pattern: Vertical Lines]				
		[Pattern: Diagonal Lines]				
	20	[Pattern: Dotted]				

AB1-024/A

Figure 3-2. Boring Log for N 1238, E 1000.

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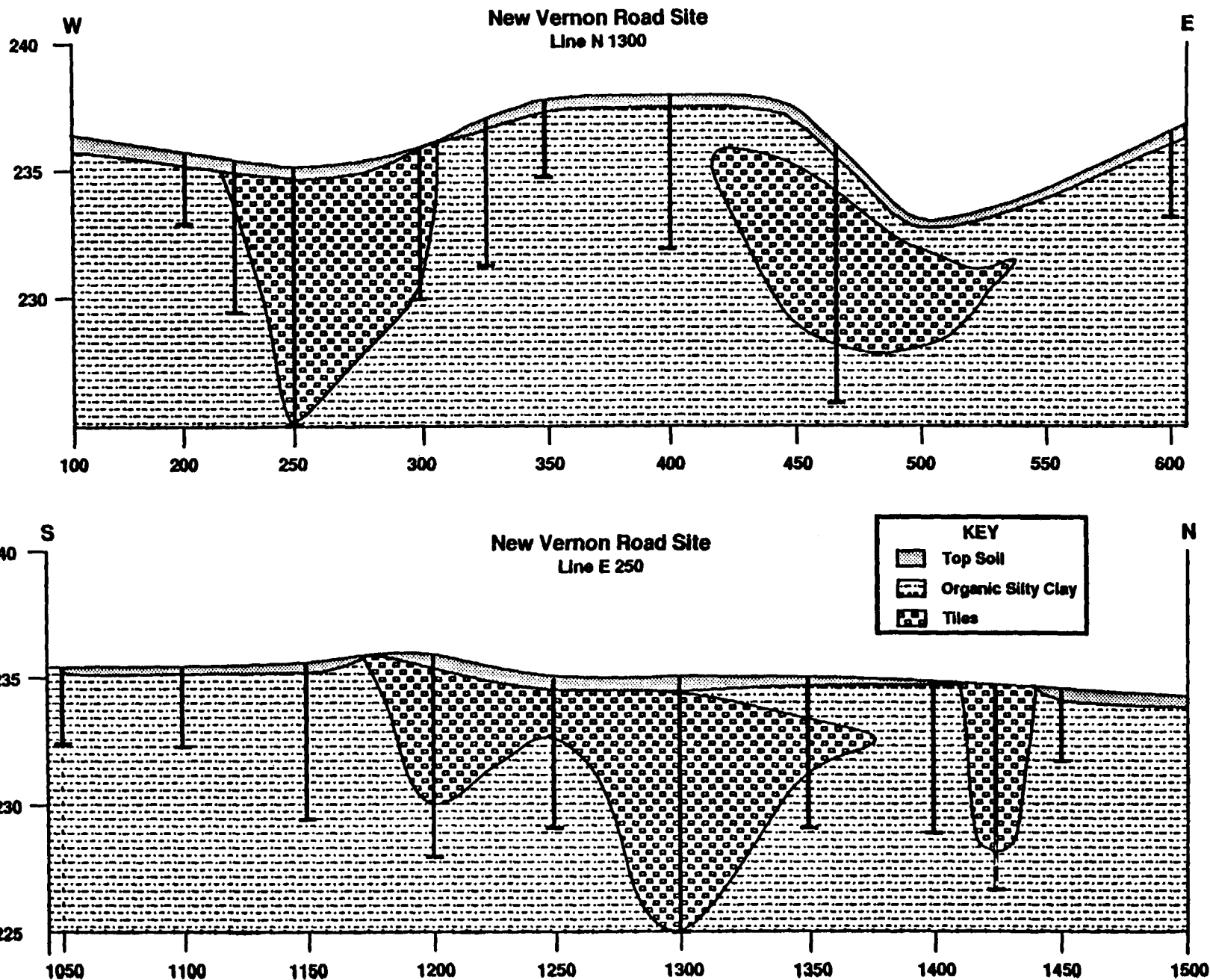


Figure 3-3. Geological cross section at New Vernon Road.



3.2 Estimated Volumes

Based on the map shown in Figure 3-1, Alliance estimates a total of 33,000 cubic yards of asbestos containing fill material to be present at the New Vernon Road Site. This estimate is comprised of 23,050 cubic yards found in the main landfill area at the northeast portion of the property and 9,950 cubic yards associated with four smaller areas located in the vicinity of the dwellings.

4.0 SUMMARY AND CONCLUSIONS

4.1 Summary

Alliance performed field sampling at the New Vernon Road site to collect additional data relevant to surface and subsurface asbestos. Soil samples were collected from surveyed grid nodes at three subsurface intervals 0 to 6, 6 to 18, and 18 to 36 inches. A drill rig was used to provide better characterization of the depth of the fill areas. The samples were evaluated by personnel trained and experienced at identifying asbestos and/or native soils. All surface samples were shipped for laboratory analysis. Any surface samples visually suspected of containing asbestos were analyzed by PLM, all others underwent analysis by TEM. A selection of subsurface samples were also analyzed after evaluation of the surface sample results. All subsurface samples were analyzed by TEM.

A total of 189 samples were analyzed by TEM. Sixty-four of the 189 samples contained detectable amounts of asbestos. Samples that did contain asbestos averaged 0.07898 percent with fiber characteristics averaging 4.3 microns in length, 0.10 microns in width, and 0.09 microns thick. The reported concentration is significantly below the statistical limit for reliable quantification and, therefore, should be reported as <0.5%.

PLM analyses were conducted on 41 samples. PLM was utilized for those samples known or highly suspected to contain asbestos. Additionally, several samples that were reported by the less sensitive PLM technique to be "less than 1 percent" were reanalyzed by TEM to better define the concentration and identify average fiber characteristics. A total of 25 PLM samples reported at <1 percent or 0.

Alliance collected sufficient information on the vertical and lateral extent of contamination of estimate the volume of fill material. Alliance estimated 33,000 cubic yards of fill material to be present at this site.

4.2 Conclusions

During this investigation, Alliance located five fill areas. One of the fill areas was the large dump in the northeast section of the property. The volume at this area represents approximately two-thirds of the total volume of fill at this site. Other smaller fill areas include two areas in front and one area behind both dwellings. An additional area was located approximately 200 feet east of the former shed. The smaller fill areas are below the surface, and therefore, a degree of control is already in place. There remains numerous points where asbestos was detected in surface samples.

The majority of the analyses performed under this Work Assignment were by TEM. The TEM technique has a stated detection limit of 0.5%. Any value with a reported

concentration below 0.5% should be considered semi-quantitative or qualitative in nature. In this sense, the data is most useful stating whether asbestos fibers were in soil samples collected away from known fill areas, and what was the average values found for fiber length, width and thickness.

The reported concentrations away from the fill areas were usually very low, identifying only a single fiber in many cases. It is suspected that these were the result of: windborne deposition originating at the fill area, surface water runoff, physical transport resulting from normal activities at the site (truck traffic), or likely some combination of each of these transport mechanisms.

Alliance has provided data for numerous samples from the New Vernon Road Site. The majority of the sample results are considered to be below detection limits for reliable quantitation of asbestos concentration. The data has been useful in identifying fiber characteristics. The next sequence is for EPA to state acceptable levels of asbestos in soil at this site, considering not only fiber characteristics but land use and potential exposures. These decisions will have a fundamental impact on the selection of remedial alternatives for the New Vernon Road site.

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